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ABSTRACT

Charles Boney, Jr., Director of Boney Architects, offers his views on school districts that build schools that have to be replaced too soon, general problems concerning renovation of older buildings, and keeping maintenance costs down. He discusses the types of flooring materials school districts should consider using to lower maintenance costs and increase longevity; the types of operating costs that are negatively impacted by lower installation costs; the types of roofing systems he designs for schools, including roofing that has good acoustical qualities. Concluding discussions address excessive use of windows and the heating and air conditioning problems that they can cause and how he solves these, and renovation materials he considers to be long lasting and characteristically have low maintenance costs. (GR)

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School Renovation and the Importance Of Maintenance

Interview with

Charles Boney, Jr.

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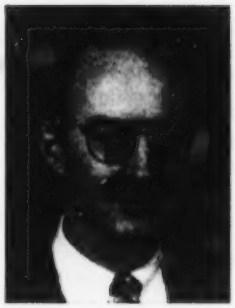
School Renovation and the Importance of Maintenance

By Eric Butterfield, Editor, School Construction News



Charles Boney Jr., AIA, is a principal and director of research and development for Boney Architects, Wilmington, N.C., where he began his service in 1978. He served as principal architect for Governors' Village, an award-winning design project for Charlotte-Mecklenburg, N.C., school district. Currently he is designing renovation/addition work for eight schools in Robeson County, N.C. This year he served as director of research for the American Institute of Architects' school facilities survey, the results of which were reported at the AIA Committee on Architecture for Education conference held April 8-9 in San Francisco. In anticipation of our interview, Mr. Boney sent us the following quote, which he felt was particularly appropriate considering the current state of K-12 schools in the United States.

"It is unwise to pay too much, but it is worse to pay too little. When you pay too much, you lose a little money—that is all. When you pay too little you sometimes lose everything because the thing you bought was incapable of doing the thing it was bought to do ... If you deal with the lowest bidder, it is well to add something for the risk you run, and if you do that you will have enough to pay for something better."
— John Ruskin (1819-1900)

In reference to John Ruskin saying it's unwise to pay too much but it's worse if you pay too little, do you think too many school districts are doing just that: building facilities that are going to have to be replaced too soon?

I can't really document that. But what we were trying to do with our research [AIA school facilities survey] was to look at what had been done in the past. One of the architects who worked with me, Jim Biehle [Inside/Out Architects, Clayton, Mo.] kept saying, "Look at all these buildings that were built back in the '50s and the '60s that we're having to tear down now;" or, about the ones built in the '70s that were built so fast and so cheap, "Are they receiving an inordinate amount of maintenance dollars?" That's one of the reasons we put this research project together.

I don't think my research is really conclusive. What we did find that we can apply to the buildings we're doing today is that quality is very relative. It's relative to the person you're talking to, it's relative to the maintenance the building receives, it's regional. Wood windows in the dry Midwest might be great, but not down here in Wilmington, N.C., because they rot out.

Trying to apply the lessons we got out of the survey, I think the message there is to really know your client. Know what they're able to maintain and not able to maintain and know what they value. There are some school districts where the kids are so well behaved and value the buildings so much that you could probably use sheet rock in the corridors. Then there are other districts where if we put sheet rock in the corridor, it would be destroyed in a matter of weeks.

"What we're trying to do is build in long-term materials ... metal roofing is a good product that

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Speaking of materials, many of your survey respondents said that quality, longevity and flexibility were important, then ended up using materials similar to what their predecessors used. What different types of materials do you think districts should consider using?

One of the recurring comments I saw in the survey concerned floor materials. We would all like to be able to use terrazzo because we know it will be there for the life of the building and is a low-maintenance installation. It looks good for a long time. There are various groups that have done studies that show that if you base your selection of floor materials on long-term costs, terrazzo will cost, let's say, half or less than half of VCT (vinyl composition tile). VCT is one of those recurring materials, it wears out every time—more than wears out, it just gets ugly over time. It gets dirty and the dirt is embedded. It's hard to revive the stuff and it is labor-intensive to maintain.

In the survey, architects would say, "We've chosen materials to be long-lasting materials." When I look at the before pictures, they show vinyl tile on the floor, and when I look at the after pictures they show vinyl tile on the floor. When I looked at the before pictures of the walls, they would have concrete block, and we've got concrete block in the new building.

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Is this the type of thing that can be changed with more consulting with architects or maintenance personnel—a way of thinking you think needs to be changed?

What I'd like to be able to do is develop a way of changing how we fund our schools. We tend to fund our schools on 'first cost' basis, which also, by the way, is how business tends to, which is fine and that's good. But if we can use, for example, terrazzo flooring—that's a good one to pick on. We know terrazzo flooring is going to last much longer than VCT, and it also requires less maintenance. If we can take those maintenance dollars for five years out and bring them into the building and buy the terrazzo, how much better off would we be over a 10-year period?

In the same breath, look at something that actually does give you money back, and that would be the energy systems. It is very easy and cheap to put in an electric heat pump in a classroom. And if you have 30 classrooms, we can put in 30 electric heat pumps. Well, the cost to operate all those heat pumps is going to be a lot more than an old-fashioned boiler and chiller, two-pipe system. But I see some school jurisdictions who end up having to make that tradeoff at first cost, then incur a great many long-term costs in exchange for that. That's not a maintenance issue, that's just an operations issue.

What other types of operating costs do you see being negatively impacted by lower installation costs? What is new on the market that perhaps school districts haven't caught up with yet?

Roofing systems are certainly something that have come into play. We all need to look at the way we spend our money and the way we value engineer our buildings.

The quality of a building that we put together is, over its lifetime, in direct relationship to the skill and care of its maintenance staff. I remember going to a building my father designed that was probably 30 years old, and that building looked like the day it was born. The maintenance staff there was proud of that building and took some pride in the facility. At the same time, I went to another building quite recently that had been occupied for about two weeks, and that building was an unmitigated maintenance disaster because the staff had not done anything to keep the building clean. The principal had done nothing to instill pride in the staff or the students.

Was the funding just not there or was it that the program was shoddy?

No, it's the caring. The materials in these two buildings were exactly the same. But the level of care from the maintenance staff in those two buildings was the difference between night and day. And I don't know whether they were short-staffed in one school compared to another. When I walked in, it just looked like nobody cared about the building. The floors had sand all over them, the trash cans were all full, it was just a mess.

You referred to roofing. What type of roofing systems are you designing for schools?

We are using a lot of metal roofs on smaller span buildings. We're using modified bitumen on larger buildings where we can't get a metal roof—larger buildings being things like high school gymnasiums that span so far that installing a metal roof or getting a sloping roof sometimes gets impractical.

What we're trying to do is build in long-term materials. What we've found is that metal roofing is a good product that is fairly easy to put down. It requires someone to be careful, but it doesn't require a rocket scientist to make it right. Generally, we try to specify a roof that

has a good manufacturer behind it, and has a good level of experience.

In North Carolina, we brought metal roofing into schools in a big way about 15 years ago. That was the result of doing research on roofing problems involving shingle roofs on three identical high schools. They were designed by another architect in the '70s. I know that he was under duress in a very ambitious building program with a very small budget and a mandate from the board of education of "no flat roofs." He used shingle roofs on these three high school prototypes. When the owner called up, the buildings were 10 years old and they had been on their third shingle roof—they had leaked from the day they were born.

At a board of education meeting, I was actually presenting another project, and someone walked in and said, "The high school roofs are leaking again," and somebody else said, "We need to do something to fix this problem. We've already had two other architects and they couldn't figure it out. Mr. Boney, what would you recommend?" And my word to them was, "I'd recommend that you let me look at it, study it, but I would almost guarantee you that I'm not going to recommend shingle roofs again." And we ended up using metal roofs as a result of that. Those schools were dry for the first time in their whole life.

What do you use to keep the sound down in classrooms when using a metal roof, say, in a heavy rainstorm?

We're really using a metal roof as a rain barrier, and we're building structure below the thing. So in our metal roofs, we end up with two separate metal membranes: one is the structural metal deck; on top of that we're putting insulation, then on top of that insulation assembly we're putting a metal roof. That does away with the sound problem.

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The National Center for Education Statistics (NCES) has reported that the average age of public schools is 42 years old, and that about 20 percent were built before 1950. Does that age pose any particular problems to the architect when renovating?

Those flat roof buildings of the '50s were built fast and cheap. They had to be because we had all those babies coming in, and lo and behold, I guess I'm one of them. The basic design was a flat roof with a double-loaded corridor and a lot of glass on the outside. In some cases, electric heat was used. They were modeled after Crow Island Elementary School [Winnetka, Ill., 1940], which was designed by a very well-known architect father and son team, Eleil and Eero Saarinen, in conjunction with the early Perkins & Will firm out of Chicago. They designed this school with many well thought out features.

That was one of the only modern school examples that had been published after the war, and everybody grabbed that example and ran with it.

The problems that we have seen in renovating that era of facility concerns the need to insert a modern heating and air-conditioning system inside the building and maintain headroom.

"The quality of a building that we put together is, over its lifetime, in direct relationship to the maintenance staff."

The materials in those buildings changed over time, in direct relationship to the availability of materials. Back in the '50s, the Korean War was heating up, and steel became hard to get. As a result of that, the concrete industry came out with a product called spandeck. It's a concrete plank that is about eight inches deep and has holes in the middle in order to make it light. They could span 20 or 30 feet with this stuff. Well, some of those spandeck materials tended to sag over time. So the problems that I've seen have involved re-roofing those buildings because you end up with puddles in the middle.

I imagine the large number of windows in those schools poses heating and air conditioning problems. How are schools solving that?

Pulling them out. We've done probably six or eight renovations of that generation building, and we've ended up taking the old windows out and putting in a much, much smaller area of window using insulated glass, which is a shame because it very much changes the character of the classroom and the character of the building on the outside. But it certainly helps the cost of heating and air conditioning in a big way.

What other materials do you specify to keep maintenance down?

There is a generation of buildings from the '20s where there are some very fine examples of architecture. Frequently, those buildings have a lot of positive public sentiment about them. It's always a challenge to keep those buildings in the school system. When we renovate those, we're looking for materials that are going to stand up for the long term. Typically those old buildings had plaster hallways. We're not replacing them with plaster anymore. We're taking the plaster out and using things like impact-resistant drywall, which has just been developed in the last five to seven years. It's proven to be a pretty good product for some of these renovations.

As for ceilings, they generally haven't been a maintenance issue. The roof above has. If

the roof fails, the ceiling looks terrible. For example, we have started using two by two ceiling grid instead of two by four. The reason for that is not so much a quality issue as it is a response to the way our clients tend to use our school buildings. That is, at least here in the South, during the summer frequently the heating and air conditioning systems get turned off. So the building ends up being humid and damp and hot. Two by four ceiling tiles sag in a situation like that. Two by two tiles tend to have more resistance.

"We're taking the plaster out and using things like impact-resistant drywall.

As a final note about quality, I would point out that architects and school facilities owners all have the same goal in mind: we want to leave a lasting product for the generations ahead. The ultimate test of our success will occur in 50 years, when succeeding generations will decide if the buildings we bequeath them should be razed or renovated. Buildings are Darwinian and the best will survive.

Inscribed on the floor of the Chicago Tribune Tower is another quote from John Ruskin which I find particularly appropriate to our schools: "Therefore when we build let us think that we build forever. Let it not be for present delight nor for present use alone. Let it be such Work as our descendants will thank us for and let us think as we lay Stone on Stone that a time is to come when those stones will be held sacred because our hands have touched them and that men will say as they look upon the labor and the wrought substance of them, 'See this our fathers did for us.' "

Charles H. Boney, Jr.
Director, Research & Development
Boney Architects
2528 Independence Boulevard. Wilmington, NC 28412
(910) 790-9901 | cb2@boneyarch.com | www.boneyarch.com
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Author: Eric Butterfield is the editor of School Construction News, http://www.schoolconstructionnews.com, a bi-monthly news magazine covering the planning, funding, design, construction and management of educational facilities. He can be reached at (415) 460-6188 or eric@emlenpub.com.

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